What is claimed is:

1. A method of producing a multi-layered tissue construct comprising the steps of:

providing a first polymerizable mixture, including, optionally, a first polymerization initiator;

providing a second polymerizable mixture, including, optionally, a second polymerization initiator;

wherein one of the first and second mixtures comprises a component selected from the group consisting of cells and a bioactive substance;

placing a volume of the first mixture in a space, then crosslinking the first mixture for a first predetermined time until the first mixture forms an at least partially gelled first layer; and

placing a volume of the second mixture in the space with the at least partially gelled first layer, then crosslinking the second mixture for a second predetermined time until the second mixture is at least partially gelled to form a second layer.

2. A method according to claim 1, wherein one of the first and second mixtures comprises cells.

3. A method according to claim 1, further comprising the step of adding a suspension of cells to a surface of the at least partially gelled first layer, before the step of placing the volume of the second mixture in the space.

4. A method according to claim 1, wherein the bioactive substance is selected from the group consisting of: a nutrient, a cellular mediator, a growth factor, a compound which induces cellular differentiation, a bioactive polymer, a gene vector, or a pharmaceutical.

5. A method as recited in claim 1, wherein the step of providing the first mixture includes mixing the first polymerizable mixture with first cells to form a first polymer-cell suspension, and the step of providing the second mixture includes mixing the second polymerizable mixture with second cells to form a second polymer-cell suspension.

6. A method as recited in claim 5, further comprising the step of:

additionally crosslinking the first mixture and the second mixture until the first layer and the second layer further polymerize to form an integrated multi-layered gel.

7. A method as recited in claim 5, wherein the first cells and the second cells are selected from the group of cell types consisting of superficial zone chondrocytes, middle zone chondrocytes, and deep zone chondrocytes.

8. A method as recited in claim 7, wherein the first cells are a cell type different from the second cells.

9. A method as recited in claim 8, wherein the first cells are deep zone chondrocytes and the second cells are superficial zone chondrocytes.

10. A method as recited in claim 7, further comprising the step of:

harvesting mammalian articular cartilage and excising tissue specimens corresponding to an upper zone, a middle zone and a deep zone of the cartilage; and

separately digesting the tissue specimens from the upper zone, the middle zone and the deep zone respectively to isolate upper zone chondrocytes, middle zone chondrocytes and deep zone chondrocytes.

11. A method as recited in claim 5, wherein the cell concentration of each suspension is approximately 20 million cells/cc.

12. A method as recited in claim 6, further comprising the step of:

incubating the multi-layered gel in a complete media for a predetermined incubation period to form the multi-layered tissue construct.

13. A method as recited in claim 5, further comprising the steps of:

providing a third polymerizable mixture, including, optionally, a third polymerization initiator, wherein the third polymerizable mixture is mixed with third cells to prepare a third polymer-cell suspension; and

placing a volume of the third mixture in the space with the at least partially gelled first layer and the at least partially gelled second layer, then crosslinking the third mixture for a third predetermined time until the third mixture is at least partially gelled to form a third layer.

14. A method as recited in claim 13, further comprising the step of:

additionally crosslinking the first layer, the second layer and the third layer to form an integrated multi-layered gel.

15. A method as recited in claim 14, wherein the first cells, the second cells and the third cells are selected from the group of cell types consisting of superficial zone chondrocytes, middle zone chondrocytes, and deep zone chondrocytes.

16. A method as recited in claim 15, wherein the first cells, the second cells and the third cells are selected to be different cell types.

17. A method as recited in claim 15, wherein the first cells are deep zone chondrocytes, the second cells are middle zone chondrocytes, and the third cells are superficial zone chondrocytes.

18. A method as recited in claim 17, further comprising the step of:

incubating the multi-layered gel in a complete media for a predetermined incubation period to form the multi-layered tissue construct.

19. A method as recited in claim 13, further comprising the steps of:

additionally crosslinking the first layer, the second layer and the third layer until the first layer, the second layer and the third layer completely polymerize to form a multi-layered gel; and

optionally incubating the multi-layered gel in a complete media for a predetermined period of time to form the multi-layered tissue construct.

20. A method as recited in claim 5, wherein the first polymerizable mixture and the second polymerizable mixture both include photopolymerizable poly(ethylene glycol) diacrylate dissolved in solvent, which is phosphate buffered saline, to make a 10% w/v solution, and the first polymerization initiator is added to the first mixture and the second polymerization initiator is added to the second mixture, wherein both the first polymerization initiator and the second polymerization initiator are the same photoinitiator, and each suspension has a concentration of 20 million cells/cc.

21. A method as recited in claim 20, wherein the photoinitiator is Igracure 2959 mixed to a concentration of 0.05% w/v in each suspension.

22. A method as recited in claim 21, wherein crosslinking of the first polymerizable mixture is controlled by exposure to external radiation and crosslinking of the second polymerizable mixture is controlled by exposure to the external radiation.

23. A method as recited in claim 5, wherein third cells are also mixed in

the first polymerizable mixture with the first cells when forming the first polymer-cell suspension.

24. A multi-layered tissue construct comprising:

a first layer comprising a first hydrogel; and

a second layer comprising a second hydrogel, wherein the first layer is connected to the second layer at a first transition zone and wherein at least one of the first layer and the second layer further comprises a component selected from the group consisting of cells and a bioactive substance.

25. A multi-layered tissue construct as recited in claim 24, wherein the first layer comprises cells of a first cellular type encapsulated in the first hydrogel.

26. A multi-layered tissue construct as recited in claim 25, wherein the second layer comprises cells of a second cellular type encapsulated in the second hydrogel, and the first cell type is different from the second cell type.

27. A multi-layered tissue construct as recited in claim 26, further comprising:

a third layer comprising cells of a third cellular type encapsulated in a third hydrogel, wherein a second transition zone connects the third layer to the second layer, and the third cell type is different from the second cell type.

28. A multi-layered tissue construct as recited in claim 27, wherein the

first cell type is a deep zone chondrocyte, the second cell type is a middle zone chondrocyte, and the third cell type is a superficial zone chondrocyte.

29. A multi-layered tissue construct as recited in claim 28, wherein the first hydrogel, the second hydrogel and the third hydrogel include photopolymerized poly(ethylene glycol) diacrylate.

30. A multi-layered tissue construct as recited in claim 26, wherein the first cell type is a deep zone chondrocyte and the second cell type is a superficial zone chondrocyte.

31. A multi-layered tissue construct as recited in claim 30, wherein the first hydrogel and the second hydrogel both include photopolymerized poly(ethylene glycol) diacrylate.

32. A multi-layered tissue construct as recited in claim 26, wherein the first cell type is a stem cell and the second cell type is an educator cell.

33. A multi-layered tissue construct as recited in claim 32, wherein the first hydrogel and the second hydrogel both include photopolymerized poly(ethylene glycol) diacrylate.

34. A multi-layered tissue construct as recited in claim 32, wherein the educator cell is a chondrocyte and the stem cell is either an embryonic stem cell or

a mesenchymal stem cell harvested from bone marrow.

35. A multi-layer tissue construct as recited in claim 25, wherein the first layer further comprises cells of a second cellular type encapsulated in the first hydrogel.

36. A multi-layered tissue construct as recited in claim 24, wherein the first layer comprises a bioactive substance selected from the group consisting of: a nutrient, a cellular mediator, a growth factor, a compound which induces cellular differentiation, a bioactive polymer, a gene vector, or a pharmaceutical.

37. A multi-layered tissue construct as recited in claim 25, wherein the first layer also includes a bioactive substance.

38. A multi-layered tissue construct as recited in claim 25, wherein the second layer includes a bioactive substance.

39. A multi-layered tissue construct comprising:

a first layer comprising a first hydrogel;

a second layer comprising cells of a first type, wherein the second layer is disposed on the first layer; and

a third layer comprising a second hydrogel and optionally cells of the first type encapsulated in the second hydrogel, wherein the third layer is disposed on the second layer.

40. A multi-layered tissue construct as recited in claim 39, wherein the second layer is connected to the first layer through an abrupt transition zone and the second layer is connected to the third layer through a smooth transition zone.

41. A multi-layered tissue construct as recited in claim 40, wherein the cells of the first type are disposed predominantly between the abrupt transition zone and the smooth transition zone.

42. A multi-layered tissue construct as recited in claim 39, wherein the third layer includes cells of the first type dispersed throughout the third layer.

43. A multi-layered tissue construct as recited in claim 39, wherein cells of the first type are selected from the group consisting of: embryonal stem cells and mesenchymal stem cells.

44. A multi-layered tissue construct as recited in claim 39, wherein the first hydrogel and the second hydrogel are made of the same material.

45. A multi-layered tissue construct as recited in claim 44, wherein the material is formed by the photopolymerization of a polymer selected from the group consisting of: poly(ethylene glycol) diacrylate and poly(ethylene oxide) diacrylate.

46. A multi-layered tissue construct as recited in claim 39, wherein one or more of the first layer and the second layer further comprises a bioactive substance.

47. A multi-layered tissue construct made by the process comprising the steps of:

(a) placing a first polymerizable mixture in a space and crosslinking the first polymerizable mixture to produce an at least partially gelled first hydrogel layer;

(b) placing a cell suspension on the first hydrogel layer, wherein the cell suspension includes cells of a first type to form a cell layer;

(c) placing a volume of a second polymerizable mixture on the cell layer; and

(d) crosslinking the second polymerizable mixture to produce an at least partially gelled second hydrogel layer integrated with the cell layer and the first hydrogel layer.

48. A multi-layered tissue construct as recited in claim 47, wherein the first polymerizable mixture and the second polymerizable mixture comprise the same polymer selected from the group consisting of: poly(ethylene glycol) diacrylate and poly(ethylene oxide) diacrylate.

49. A multi-layered tissue construct as recited in claim 48, wherein a photoinitiator is dissolved in the first polymerizable mixture and a photoinitiator is

dissolved in the second polymerizable mixture so that the first polymerizable mixture is crosslinked when exposed to external radiation and the second polymerizable mixture is crosslinked when exposed to external radiation.

50. A multi-layered tissue construct as recited in claim 49, wherein the cells of a first type are adult stem cells.

51. A multi-layered tissue construct as recited in claim 47, wherein cells of the first type are suspended in the second polymerizable mixture.

52. A multi-layered tissue construct as recited in claim 47, wherein cells of a second type are suspended in the second polymerizable mixture.